

Lecture 08 : Philosophical Issues in Behavioural Science

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Contents

1	Introduction	2
2	Team Reasoning and Aggregate Agents	2
2.1	Prerequisites	2
2.2	A Clarification	3
2.3	A Qualification	3
3	From Team Reasoning to Shared Intention	4
3.1	Prerequisites	4
3.2	Sources for Further Research	4
3.3	Other Approaches to Joint Action	4
4	Collective Goals	5
4.1	Prerequisites	5
4.2	Key Notions	6
5	Could Motor Representations Ground Collective Goals?	6
5.1	Why suppose that the conjecture is true?	6
5.2	If true, what could the conjecture explain?	7
5.3	Appendix: More Detail	8
5.3.1	Bimanual Coordination in Ordinary, Individual Action	8
5.3.2	Parallel Planning	8
5.3.3	How the Interagential Structure Coordinates	10
5.4	Appendix: Further Sources	10
6	Question Session 08	10
	Glossary	10

1. Introduction

This lecture depends on you having studied some sections from a previous lecture:

- *Motor Representation* in Lecture 03
- *The Question* in Lecture 04
- *What Is Team Reasoning?* in Lecture 07

For the minimum course of study, none of this lecture is needed.

This lecture has two parts that you can study independently of each other. It is quite likely that you will want to consider at most one of the two parts.

The first part concerns applications of team reasoning to theories of aggregate subjects and shared intentions. In this first part we are concerned with how discoveries about game theory and its limits might be important for philosophical theories of joint action.

The second part introduces some discoveries in psychology and neuroscience about the role of motor representation in joint action and examines their implications for philosophical theories.

2. Team Reasoning and Aggregate Agents

2.1. Prerequisites

This section depends on you having studied some sections from a previous lecture:

- *Question Session 05* in Lecture 05 (introduces the notion of an aggregate subject and Pettit (2014)'s idea about self-representation could bring them into existence)
- *What Are Preferences?* in Lecture 06 (to have preferences, your choices must satisfy axioms including transitivity, completeness and independence. If your choices do not satisfy the axioms, this does not mean that your preferences are irrational or defective: it means that you do not have preferences at all.)
- *What Is Team Reasoning?* in Lecture 07

2.2. A Clarification

Why do aggregate subjects that are a consequence of team reasoning neither require the kind of self-reflection that Pettit (2014)'s idea involves nor presuppose shared agency? It is because

Sugden's 'account of team agency does not require that the individuals who participate in it agree to do so, or openly express their willingness to do so. What is required instead is that there is confidence among the members of the team that each of them will engage in team-directed reasoning with respect to a common set of team preferences.' (Sugden 2000, p. 196)

2.3. A Qualification

Sugden himself would disagree with the view about what preferences are that is assumed in this section. (This view about preferences was introduced in *What Are Preferences?* in Lecture 06). Sugden rejects that view on the grounds that:

'On some revealed-preference accounts, preference is nothing more than a disposition that a person may come to have, for whatever reason or for none, which prompts her to choose actions of one kind rather than actions of another. However, such an interpretation of preference seems not to acknowledge the sense in which the theory of rational choice is a theory of reasoning.¹ It would be more faithful to the practice of rational choice theory to say that a person's preferences are whatever she takes to be choice-relevant reasons, all things considered.' (Sugden 2000, p. 197)

This requires that we, as researchers, have a shared understanding of preference as 'taking something to be a choice relevant reason' and that this understanding is not anchored by decision theory.

¹ Is decision theory ('the theory of rational choice') a theory of reasoning? Arguably it is a model which can be applied to various projects including understanding processes that might be called reasoning (see *Are Objections to Decision Theory also Objections to the Dual Process Theory of Action?* in Lecture 06) as well as to things that are probably not reasoning (for example, motor control; see Trommershäuser et al. 2009). As reflection on these applications shows, to say that preference is a construct of decision theory does not imply that 'preference is nothing more than a disposition ... to choose actions'.

3. From Team Reasoning to Shared Intention

Does reflection on team reasoning enable us to understand shared intention and therefore joint action. In this section introduces Pacherie (2013)'s proposal. And highlights four questions for proponents of team-reasoning based accounts of shared intention.

3.1. Prerequisites

This section depends on you having studied some sections from a previous lecture:

- *Bratman on Shared Intentional Action* in Lecture 04
- *What Is Team Reasoning?* in Lecture 07

3.2. Sources for Further Research

Gold & Sugden (2007) give an account of shared intention involving team reasoning. (Roughly, shared intentions are ordinary individual intentions; the difference is just that the shared intentions are formed as a consequence of team reasoning.)

Pacherie (2013) gives an alternative account of shared intention involving team reasoning.

Gold & Sugden (2007) and Pacherie (2013) both offer objections to *Bratman on Shared Intentional Action* in Lecture 04.

Bratman (1985, p. 96) replies to Gold & Sugden (2007)'s objection (do read the footnotes, that's where much of the substance is).

On what might prompt agents to engage in team reasoning, Hindriks (2012) critically discusses both Bacharach's and Sugden's different views.

Bermúdez (2020, pp. 188ff) offers 'two very significant difficulties for Bacharach's theory' of team reasoning. This discussion is not directly relevant to Gold & Sugden (2007) and Pacherie (2013).

3.3. Other Approaches to Joint Action

There are a wide range of other approaches to characterising joint action which are not covered in these lectures but are relevant to the syllabus.

Gilbert (1990, 2013) develops an alternative to Bratman based on her notion of joint commitment.

It may be that Tuomela & Miller (1988) and Searle (1990)'s response initiated contemporary debate. (Brooks (1981) does not appear to have been considered.)

Many philosophers agree that distinguishing acting jointly from acting in parallel but merely individually involves invoking states of the agents who are acting jointly, often dubbed 'we-', 'shared' or 'collective intentions'. Some hold that the states in question involve a novel attitude (Searle 1990; Gallotti & Frith 2013). Others have explored the notion that the primary distinguishing feature of these states is not the kind of attitude involved but rather the kind of subject, which is plural (Helm 2008). Or they may differ from ordinary intentions in involving distinctive obligations or commitments to others (Gilbert 1992; Roth 2004).

No all philosophers invoke shared intention to explicate joint action. Peterson (2007, p. 138), for instance, attempts to explicate the distinction between acting jointly and acting in parallel but merely individually 'in terms of dispositions and causal agency'. See also Chant (2007) for another alternative line.

Miller (2001) is unusual in focussing first on ends (which I label goals) rather than starting with some kind of intention or other mental state.

Ludwig (2007, 2016) offers a distinctive approach based on semantic analysis. Although this is sometimes viewed as a variant of Bratman's theory, Ludwig and Bratman probably disagree on fundamental issues about what a theory of joint action is supposed to achieve. Helpfully, Ludwig (2015) has discussed Bratman.

4. Collective Goals

An outcome is a collective goal of two or more actions involving multiple agents just if the actions are directed to this goal and this is not, or not just, a matter of each action being individually directed to that goal.

4.1. Prerequisites

This section depends on you having studied some sections from a previous lecture:

- *Togetherness vs the Simple Theory of Joint Action* in Lecture 04

4.2. Key Notions

An outcome is a *collective goal* of two or more actions involving multiple agents if it is an outcome to which those actions are directed where this is not, or not only, a matter of each action being directed to the outcome.

Can you give sufficient conditions for there to be a collective goal? Yes!

If there is a single outcome, G, such that

1. Our actions are coordinated; and
2. coordination of this type would normally increase the probability that G occurs.

then there is an outcome to which our actions are directed where this is not, or not only, a matter of each action being directed to that outcome, i.e. our actions have a collective goal.

Question for a theory of joint action: In virtue of what could two or more agents' actions have a collective goal?

5. Could Motor Representations Ground Collective Goals?

Motor representations can ground collective goals in this sense: in some cases, two or more actions involving multiple agents have a collective goal in virtue of the actions being appropriately related to an interagential structure of motor representations. Or so the discoveries presented in this section suggest.

This section considers the conjecture that some motor representations specify collective goals.²

5.1. Why suppose that the conjecture is true?

Various predictions of the conjecture have recently been tested and confirmed (Sacheli et al. 2021, 2018; della Gatta et al. 2017; Clarke et al. 2019). As this evidence is still quite limited, we cannot yet be very confident that the conjecture is true. There is also a larger body of evidence that indirectly motivates it, some of which is introduced in the video.

² this conjecture is a version of Pacherie & Dokic (2006, p. 111)'s view that in 'joint action control [...] each agent adjusts his own actions as a function of the common goal and of the predicted consequences of the actions of other participants.' Related ideas can also be found in della Gatta et al. (2017); Sacheli et al. (2018); Clarke et al. (2019).

5.2. If true, what could the conjecture explain?

Any account of joint action should answer the question,

In virtue of what could two or more agents' actions have a collective goal?

In some cases, it is probably the agents' shared intention in virtue of which their actions have a collective goal (whatever exactly shared intention turns out to be.)

But if the conjecture is true, there are cases in which it is in virtue of an interagential structure of motor representations that actions have a collective goal (whatever exactly shared intention turns out to be.)

What is this interagential structure of motor representations?

First, there must be an outcome to which the actions are, or could be, collectively directed, and in each agent there must be a motor representation of this outcome.

Second, these motor representations must trigger planning-like processes which result in plan-like hierarchies of motor representations in each agent.

Third, the plan-like hierarchy in each agent must involve motor representations concerning not only actions she will eventually perform but also actions another will eventually perform.

Fourth, the plan-like hierarchies of motor representations in the agents must non-accidentally match.

When all four conditions are met, the result is an interagential structure of motor representations.

Because the existence of this interagential structure would provide for the coordination of the agents' actions around the outcome represented motorically, it ensures that sufficient conditions are met for the existence of a collective goal of their actions. (The sufficient conditions featured in the section on *Collective Goals* (section §4).)

Note that this does not imply that there are any cases of joint action which do not involve shared intention. The challenge to the philosophical accounts (e.g. *Bratman on Shared Intentional Action* in Lecture 04) is not that they fail to give necessary conditions. It is that there are basic questions about joint action which cannot be fully answered without going beyond philosophical frameworks to consider scientific discoveries.

5.3. Appendix: More Detail

Does the interagential structure of motor representations identified above really provide for coordination?

How could it do so?

To fully understand this, we need two things. An understanding of bimanual coordination in ordinary, individual action. And the notion of parallel planning.

5.3.1. Bimanual Coordination in Ordinary, Individual Action

Consider what is involved when, in acting alone, you move a mug from one place to another, passing it between your hands half-way. In this action there is a need to coordinate the exchange between your two hands. If your action is fluid, you may proactively prepare to release the mug from your left hand moments in advance of the mug's being secured by your right hand (compare Diedrichsen et al. 2003). How is such tight coordination achieved? A full answer cannot be given by appeal to physiology alone (Jackson et al. 2002; Piedimonte et al. 2015). Instead, part of the answer involves the fact that there is a motor representation for the whole action which triggers planning-like motor processes, so that the motor representations and processes concerning the actions involving each hand are not entirely independent of each other (compare Kelso et al. 1979 and Rosenbaum 2010, pp. 244–8). Such planning-like processes result in motor representations concerning different parts of the action which can be hierarchically arranged by the means-ends relation and ensure that relational constraints on components of the action are satisfied. So when you move a mug from one place to another, passing it between your hands half-way, and when this action and its components are represented motorically in a plan-like hierarchy, it is this plan-like hierarchy which ensures the movements of one hand constrain and are constrained by the movements of the other hand.

This is how motor representations of outcomes can coordinate the actions of an individual agent using two hands.

Now switch from an individual agent performing a bimanual action to two agents acting together.

Motor representation can play a similar role when two agents act together. To see how, we need the notion of parallel planning.

5.3.2. Parallel Planning

When we considered *Bratman on Shared Intentional Action* in Lecture 04, we followed him in focussing on interconnected planning. This is planning in

which facts about your plans feature in mine and conversely:

‘each agent does not just intend that the group perform the [...] joint action. Rather, each agent intends as well that the group perform this joint action in accordance with subplans (of the intentions in favor of the joint action) that mesh.’ (Bratman 1992, p. 332)

On Bratman’s view,

‘shared intentional agency consists, at bottom, in interconnected planning agency of the participants.’ (Bratman 2011).

Our planning is *parallel* just if you and I are each planning actions that I will eventually perform and actions that you will eventually perform, where the resulting plans non-accidentally match.

For parallel planning to be possible without irrationality, it can involve only agent-neutral representations and processes. It must also result in intentions that are open-ended with respect to who will act.

It may be controversial whether parallel planning involving practical reasoning and intentions is actually at all possible without irrationality. But our concern is different: we know that some motor processes are planning-like in that they involve computing means from representations of ends and in that they involve satisfying relational constraints on actions happening at different times. Perhaps there is something like parallel planning that involves not practical reasoning and intentions but motor processes and representations?

But is there any evidence that parallel planning involving motor representations ever occurs? Planning concerning another’s actions sometimes occurs not only in observing her act but also in exercising collective agency with her (Kourtis et al. 2013; Meyer et al. 2011). Such planning can inform planning for your own actions, and even planning that involves meeting constraints on relations between your actions and hers (Vesper et al. 2013; Novembre et al. 2014; Loehr & Palmer 2011; Meyer et al. 2013).³

³ This evidence is compatible with two possibilities. It could be that there is a single planning processes concerning all agents’ actions, just as parallel planning requires; but it might also be that, in each agent, there are two largely separate planning processes, one for each agent’s actions. But, as mentioned above, there is evidence that collective goals are represented motorically. This evidence suggests that sometimes when exercising collective agency, the agents have a single representation of the whole action, not only separate representations of each agent’s part (see also Tsai et al. 2011; Loehr et al. 2013; Ménoret et al. 2014). It follows that the second possibility obtains, at least sometimes.

5.3.3. How the Interagential Structure Coordinates

So how does the interagential structure of motor representations identified above provide for coordination of two agents' actions?

The plan-like structure of motor representations in you concerns not only actions you will perform but also actions I will perform. This ensures that your actions are constrained by your plan for my actions. But because your plan-like structure matches my plan-like structure, this means that your actions are, in effect, constrained by my plan for my actions. And conversely.

So the interagential structure of motor representations identified above provides for the coordination of our actions in something like the way that motor representations coordinate the bimanual actions of an individual agent.⁴

5.4. Appendix: Further Sources

There are lots of additional sources in the references section of a guide to psychological research on coordination in joint action written for philosophers (Butterfill 2017).

As you can see from the video, quite a bit has happened since that guide was written. The new research mostly confirms and extends the earlier research.

6. Question Session 08

These are the slides I prepared for the question session. In the end we had a small-group discussion about just part of this. Because the event turned into a discussion, there is no recording. You are of course welcome to ask questions.

Glossary

agent-neutral A representation or plan is *agent-neutral* if its content does not specify any particular agent or agents; a planning process is *agent-neutral* if it involves only agent-neutral representations. 9

aggregate subject A subject whose proper parts are themselves subjects. A paradigm example would be a Portuguese man o' war (Physalia

⁴ There are some important differences, of course. Most obviously, in the case of joint action there is more than one agent and so more than one plan-like structure of motor representations. And since in each of us there are representations of actions the other will eventually perform, something must prevent these motor representations from producing actions.

physalis), which is an animal that can swim and eat and whose swimming and eating is not simply a matter of the swimming or eating of its constituent animals. Distinct from, but sometimes confused with, a plural subject. 2, 3, 12

bimanual two-handed 8

collective goal an outcome to which two or more agents' actions are directed where this is not, or not only, a matter of each action being directed to that outcome. 6

decision theory I use 'decision theory' for the theory elaborated by Jeffrey (1983). Variants are variously called 'expected utility theory' (Hargreaves-Heap & Varoufakis 2004), 'revealed preference theory' (Sen 1973) and 'the theory of rational choice' (Sugden 1991). As the differences between variants are not important for our purposes, the term can be used for any of core formal parts of the standard approaches based on Ramsey (1931) and Savage (1972). 3

game theory This term is used for any version of the theory based on the ideas of von Neumann et al. (1953) and presented in any of the standard textbooks including. Hargreaves-Heap & Varoufakis (2004); Osborne & Rubinstein (1994); Tadelis (2013); Rasmusen (2007). 2

goal A *goal* of an action is an outcome to which it is directed. 5

interconnected planning Our plans are *interconnected* just if facts about your plans feature in mine and conversely. Contrast parallel planning. 8, 12

match [*of outcomes*] Two collections of outcomes, A and B, *match* in a particular context just if, in that context, either the occurrence of the A-outcomes would normally constitute or cause, at least partially, the occurrence of the B-outcomes or vice versa.

To illustrate, one way of matching is for the B-outcomes to be the A-outcomes. Another way of matching is for the B-outcomes to stand to the A-outcomes as elements of a more detailed plan stand to those of a less detailed one.

[*of plan-like structures*] In the simplest case, plan-like hierarchies of motor representations *match* if they are identical. More generally, plan-like hierarchies *match* if the differences between them *do not matter* in the following sense. For a plan-like hierarchy in an agent, let the

self part be those motor representations concerning the agent's own actions and let the *other part* be the other motor representations. First consider what would happen if, for a particular agent, the other part of her plan-like hierarchy were as nearly identical to the self part (or parts) of the other's plan-like hierarchy (or others' plan-like hierarchies) as psychologically possible. Would the agent's self part be different? If not, let us say that any differences between her plan-like hierarchy and the other's (or others') are *not relevant* for her. Finally, if for some agents' plan-like hierarchies of motor representations the differences between them are not relevant for any of the agents, then let us say that the differences *do not matter*. 7, 10

model A model is a way some part or aspect of the world could be. 3

motor representation The kind of representation characteristically involved in preparing, performing and monitoring sequences of small-scale actions such as grasping, transporting and placing an object. They represent actual, possible, imagined or observed actions and their effects. 2, 6, 7

outcome An outcome of an action is a possible or actual state of affairs. 6, 11

parallel planning Our planning is *parallel* just if you and I are each planning actions that I will eventually perform and actions that you will eventually perform, where the resulting plans non-accidentally match. Contrast interconnected planning. 8, 9, 11

planning-like A process is *planning-like* if has features characteristic of planning. For instance, it may start with representations of relatively distal outcomes and gradually fill in details, resulting in representations whose contents can be hierarchically arranged by the means–end relation (compare Grafton & Hamilton 2007 on motor processes). Or a process may be *planning-like* in that it involves meeting constraints on the selection of means by which to bring about one outcome that arise from the need to select means by which, later, to bring about another outcome (Rosenbaum et al. 2012). 8, 9

plural subject Some subjects who are collectively the subject of an intention or other attitude. If there is one token intention that is both my intention and your intention and no one else's intention, then we are the plural subject of that intention. (The intention is therefore shared in the same sense that, if we were siblings, we would share a parent.) Distinct from, but sometimes confused with, an aggregate subject. 11

practical reasoning ‘The mark of practical reasoning is that the thing wanted is *at a distance* from the immediate action, and the immediate action is calculated as a way of getting or doing or securing the thing wanted’ (Anscombe 1957, p. 79). See also Millgram (2001, p. 1): ‘Practical reasoning is reasoning directed towards action: figuring out what to do, as contrasted with figuring out how the facts stand.’ 9

shared intention An attitude that stands to joint action as ordinary, individual intention stands to ordinary, individual action. It is hard to find consensus on what shared intention is, but most agree that it is neither shared nor intention. (Variously called ‘collective’, ‘we-’ and ‘joint’ intention.) 2, 4, 7

team reasoning ‘somebody team reasons if she works out the best possible feasible combination of actions for all the members of her team, then does her part in it’ (Bacharach 2006, p. 121). 2, 4

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